REMARKS

Claims 1-36 are pending in the subject application. Claims 1 and 16 are amended, claims 28-36 are canceled, and claims 37-39 are added. Support for the amendment to the claims and added claims is found throughout the Specification, as filed, (e.g. see page 4, lines 4-25; page 9, lines 18-26) and no new matter is presented by the amendment.

1. Specification

Applicants have corrected the typographical error in claim 6 as suggested by the Office.

2. 35 U.S.C. §103 Rejections

Claims 1-36 are rejected under 35 U.S.C. §103(a) over Judd et al (U.S. Patent No. 5,910,112) and Weissleder (U.S. Patent No. 5,492,814). Applicants respectfully traverse.

Applicants teach ^{23}Na and ^{39}K magnetic resonance imaging (MRI) of cardiac tissues using a paramagnetic contrast agent.

^{23}Na MRI detects myocardial infarction through altered sodium levels associated with cardiac tissue impaired sodium-potassium pump function of non-viable tissue after acute infarction and reperfusion. Thus, ^{23}Na MRI signal elevations are associated with non-viable myocardium. However, in addition to infarcted cardiac tissue, ^{23}Na MRI produces an intense signal for ventricular blood present in ventricular cavities. As a result, there is minimal signal intensity differences between the signal for infarcted cardiac tissue and the ventricular cavities. This lack of signal intensity differences hampers the detection of infracted myocardium tissue. ^{39}K MRI suffers from similar problems.

Applicants provide methods and compositions for use in ^{23}Na MRI and ^{39}K MRI that solve this problem. In particular, a paramagnetic contrast agent (iron oxide) is introduced to attenuate the MRI signal for ventricular cavity blood and viable well-perfused tissue, as set out in

Applicant's independent claim 1. The contrast agent can further be administered so as to (1) minimize the signal intensity difference between ventricular cavity blood and viable well-perfused tissue, (2) maximize signal intensity differences between non-viable myocardium and ventricular cavity blood in myocardial infarction; and (3) maximize signal intensity differences between non-viable myocardium and well-perfused viable myocardium in myocardial infarction, as set out in Applicant's independent claim 16.

Judd, on the other hand, relates to methods for making ^{23}Na and ^{39}K MRI practical in humans. As set out in Judd, ^{23}Na and ^{39}K MR signals are approximately 22,000 and 2.1 million times smaller than standard ^{1}H MR signals, respectively (col. 1, line 67- col. 2, line 3; col. 4, lines 47-50). Thus, in order for ^{23}Na and ^{39}K imaging to be practical in humans, the signals must be increased by these amounts (col. 5, lines 62-64).

Thus, Judd merely describes the manipulation of imaging parameters so as to increase the overall MR signals for ^{23}Na and ^{39}K to a detectable level. Judd does this by optimizing imaging parameters (e.g. by increasing voxel size, lengthening imaging time taking, employing fast imaging pulse sequences, using GRE imaging, and selection of receiver bandwidth)(see e.g. col. 6, lines 10-11, 19-21, 57-59, and 66-67)

Judd does not at all relate to a method or composition for performing ^{23}Na and ^{39}K MRI on cardiac tissues so as to address the problem of minimal signal intensity differences between the signal for infarcted cardiac tissue and ventricular blood present in the ventricular cavities. In fact, Judd does not suggest that the presence of ventricular blood in the ventricular cavities can cause a problem with ^{23}Na or ^{39}K MRI imaging of infracted myocardium tissues, or how and if this problem can be solved.

As further acknowledged by the Office, Judd does not expressly teach the use of an iron oxide contrast agent.

Clearly, Judd at least does not teach or suggest a method for evaluating myocardial tissue using ^{23}Na or ^{39}K MRI comprising treating the myocardial tissue with an iron oxide contrast agent so as to selectively attenuate the ^{23}Na or ^{39}K signal for ventricular cavity blood and well-viable perfused tissue, as recited in Applicants' claim 1.

Further, Judd clearly does not teach or suggest a method for identifying infarcted myocardial tissue of a subject using ^{23}Na or ^{39}K MRI comprising administering to the subject an imaging-effective amount of an iron oxide contrast agent so as to minimize signal intensity differences between ventricular cavity blood and well-perfused viable myocardium, maximize signal intensity differences between non-viable myocardium and ventricular cavity blood in myocardial infarction, and maximize signal intensity differences between non-viable myocardium and well-perfused viable myocardium in myocardial infarction, as recited in Applicants' claim 16.

Weissleder does not remedy these deficiencies in Judd. Weissleder describes paramagnetic compounds for MRI. The compounds have a magnetically responsive core (MRC) with an attached anchored surface molecule (ASM). A target specific molecule can further be attached to the MRC-ASM complex to convey specificity to the MRC-ASM complex.

Like Judd, Weissleder does not at all relate to a method or composition for performing ^{23}Na and ^{39}K MRI on cardiac tissues so as to address the problem of minimal signal intensity differences between the signal for infarcted cardiac tissue and ventricular blood present in the ventricular cavities.

Weissleder does not teach or suggest a method for evaluating myocardial tissue using ^{23}Na or ^{39}K MRI wherein the myocardial tissue is treated with an iron oxide contrast agent so as

to selectively attenuate the ^{23}Na or ^{39}K signal for ventricular cavity blood and well-viable perfused tissue, as recited in Applicants' claim 1.

Further, Weissleder does not teach or suggest a method for identifying infarcted myocardial tissue of a subject using ^{23}Na or ^{39}K MRI comprising administering to the subject an imaging-effective amount of an iron oxide contrast agent so as to minimize signal intensity differences between ventricular cavity blood and well-perfused viable myocardium, maximize signal intensity differences between non-viable myocardium and ventricular cavity blood in myocardial infarction, and maximize signal intensity differences between non-viable myocardium and well-perfused viable myocardium in myocardial infarction, as recited in Applicants' claim 16.

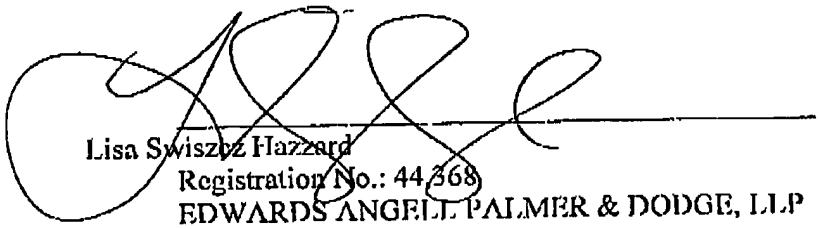
Accordingly, claims 1 and 16 are patentable over Judd and Weissleder. Claims 2-15, 17-27, 37, and 38 depend from claims 1 and 16 and, likewise, are patentable over Judd and Weissleder. Claims 28-26 have been canceled and, thus, rejection of these claims is moot.

In view thereof, reconsideration and withdrawal of the rejection are requested.

CONCLUSION

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,



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